

CLAIMS

1. (Original) A method for operating an integrated circuit having an image sensor with at least one photoelement comprising the steps of:
 - (a) generating charge by the photoelement; and
 - (b) applying at least a first portion of the charge generated by the photoelement to other circuitry to reduce consumption of power from a power supply.
2. (Original) The invention of claim 1, wherein the integrated circuit is powered by the power supply.
3. (Original) The invention of claim 1, wherein the photoelement is a photodiode, a phototransistor, a photogate, photo-conductor, a charge-coupled device, a charge-transfer device, or a charge-injection device.
4. (Original) The invention of claim 1, wherein the other circuitry is implemented within the integrated circuit.
5. (Original) The invention of claim 1, wherein step (a) is a standby mode for the image sensor.
6. (Original) The invention of claim 1, wherein step (a) is an integration step of a normal operation mode for the image sensor.
7. (Original) The invention of claim 6, wherein step (b) comprises the steps of:
 - (1) transferring the first portion of the charge from the photoelement to a storage device during a reset step of the normal operation mode for the image sensor; and
 - (2) applying the first portion of the charge from the storage device to the other circuitry during a standby mode for the image sensor.
8. (Original) The invention of claim 7, wherein:
 - during a first phase of the reset step of the normal operation mode, the first portion of the charge is transferred from the photoelement to the storage device; and
 - during a second phase of the reset step of the normal operation mode, a second portion of the charge is discharged from the photoelement.
9. (Original) The invention of claim 8, wherein at least one control signal is generated to transition between the first phase and the second phase of the reset step.
10. (Original) The invention of claim 9, wherein voltage across the storage device is detected to generate the control signal.
11. (Original) The invention of claim 9, wherein the control signal is generated after a specified time interval.
12. (Original) The invention of claim 9, wherein current across the other circuitry is detected to generate the control signal.
13. (Original) The invention of claim 7, wherein:

during a first phase of the standby mode, power is applied to the other circuitry by the storage device; and

during a second phase of the standby mode, power is applied to the other circuitry by the power supply.

14. (Original) The invention of claim 13, wherein at least one control signal is generated to transition between the first phase and the second phase of the standby mode.

15. (Original) The invention of claim 14, wherein voltage across the storage device is detected to generate the control signal.

16. (Original) The invention of claim 14, wherein the control signal is generated after a specified time interval.

17. (Original) The invention of claim 14, wherein current across the other circuitry is detected to generate the control signal.

18. (Original) The invention of claim 7, wherein the storage device is a capacitor implemented externally to the integrated circuit.

19. (Original) A circuit comprising:
(a) an image sensor having at least one photoelement implemented in an integrated circuit;
and
(b) other circuitry, wherein the photoelement generates charge that is applied to the other circuitry to reduce consumption of power from a power supply.

20. (Original) The invention of claim 19, wherein the circuit is powered by the power supply.

21. (Original) The invention of claim 19, wherein the photoelement is a photodiode, a phototransistor, a photogate, photo-conductor, a charge-coupled device, a charge-transfer device, or a charge-injection device.

22. (Original) The invention of claim 19, wherein the other circuitry is implemented within the integrated circuit.

23. (Original) The invention of claim 19, further comprising a storage device, wherein:
during a reset step of the normal operation mode for the image sensor, the circuit is configured to transfer at least a first portion of the charge from the photoelement to the storage device; and
during a standby mode for the image sensor, the circuit is configured to apply the first portion of the charge from the storage device to the other circuitry.

24. (Original) The invention of claim 23, wherein:
during a first phase of the reset step, the circuit is configured to transfer the first portion of the charge from the photoelement to the storage device; and
during a second phase of the reset step, the circuit is configured to discharge a second portion of the charge from the photoelement.

25. (Original) The invention of claim 24, further comprising a control circuit configured to generate at least one control signal to transition between the first phase and the second phase of the reset step.

26. (Original) The invention of claim 25, wherein the control circuit is configured to detect voltage across the storage device to generate the control signal.

27. (Original) The invention of claim 25, wherein the control circuit is configured to generate the control signal after a specified time interval.

28. (Original) The invention of claim 25, wherein the control circuit is configured to detect current across the other circuitry to generate the control signal.

29. (Original) The invention of claim 23, wherein:
during a first phase of the standby mode, the circuit is configured to apply power to the other circuitry by the storage device; and
during a second phase of the standby mode, the circuit is configured to apply power to the other circuitry by the power supply.

30. (Original) The invention of claim 29, further comprising a control circuit configured to generate at least one control signal to transition between the first phase and the second phase of the standby mode.

31. (Original) The invention of claim 30, wherein the control circuit is configured to detect voltage across the storage device to generate the control signal.

32. (Original) The invention of claim 30, wherein the control circuit is configured to generate the control signal after a specified time interval.

33. (Original) The invention of claim 30, wherein the control circuit is configured to detect current across the other circuitry to generate the control signal.

34. (Original) The invention of claim 23, wherein the storage device is a capacitor implemented externally to the integrated circuit.

35. (Currently amended) The invention of claim 23, further comprising:
a first set of one or more switches (~~e.g., 324 and 330 of Fig. 3~~) configured to selectively connect the storage device to the other circuitry; and
a second set of one or more switches (~~e.g., 326 and 328~~) configured to selectively connect the power supply to the other circuitry.

36. (Currently amended) The invention of claim 35, wherein:
the first set of one or more switches comprises:
a first switch (~~e.g., 322~~) configured between the storage device and the photoelement;
a second switch (~~e.g., 324~~) configured between the storage device and a first terminal of the other circuitry ;
a third switch (~~e.g., 332~~) configured between the storage device and a first terminal of the power supply; and
a fourth switch (~~e.g., 330~~) configured between the storage device and a second terminal of the other circuitry; and

the second set of one or more switches comprises:

a fifth switch (~~c.g., 326~~) configured between the first terminal of the other circuitry and a second terminal of the power supply, and

a sixth switch (~~c.g., 328~~) configured between the second terminal of the other circuitry and the first terminal of the power supply, wherein:

during a first phase of the reset step of the normal operation mode, the first, third, fifth, and sixth switches are closed and the second and fourth switches are open;

during a second phase of the reset step of the normal operation mode, the first, second, third, and fourth switches are open and the fifth and sixth switches are closed;

during a first phase of the standby mode, the first, third, fifth, and sixth switches are open and the second and fourth switches are closed; and

during a second phase of the standby mode, the first, second, third, and fourth switches are open and the fifth and sixth switches are closed.

37. (Currently amended) The invention of claim 19, further comprising:

a first set of one or more switches (~~c.g. 422 and 424 of Fig. 4~~) configured to selectively connect the photoelement to the other circuitry;

a second set of one or more switches (~~c.g. 420~~) configured to selectively connect the photoelement to the power supply.

38. (Currently amended) The invention of claim 37, wherein:

the first set of one or more switches comprises:

a first switch (~~c.g. 422~~) configured between the negative node of the photoelement and a first terminal of the other circuitry;

a second switch (~~c.g. 424~~) configured between the positive node of the photoelement and a second terminal of the other circuitry; and

the second set of one or more switches comprises:

a third switch (~~c.g. 420~~) configured between the negative node of the photoelement and the negative power supply, wherein:

during the standby mode, the first and second switches are closed and the third switch is open;

during normal operation, the first and second switches are open and the third switch is closed.